

# PATENT COOPERATION TREATY

**PCT**

## NOTIFICATION OF ELECTION

(PCT Rule 61.2)

From the INTERNATIONAL BUREAU

To:

Assistant Commissioner for Patents  
United States Patent and Trademark  
Office  
Box PCT  
Washington, D.C.20231  
ETATS-UNIS D'AMERIQUE

in its capacity as elected Office

<b>Date of mailing (day/month/year)</b> 08 June 2000 (08.06.00)	
<b>International application No.</b> PCT/EP99/07505	<b>Applicant's or agent's file reference</b> E-5629/98 Bis
<b>International filing date (day/month/year)</b> 06 October 1999 (06.10.99)	<b>Priority date (day/month/year)</b> 07 October 1998 (07.10.98)
<b>Applicant</b> BENEDETTI, Paolo et al	

1. The designated Office is hereby notified of its election made:

☒ in the demand filed with the International Preliminary Examining Authority on:  
03 May 2000 (03.05.00)

☐ in a notice effecting later election filed with the International Bureau on:

2. The election ☒ was

☐ was not

made before the expiration of 19 months from the priority date or, where Rule 32 applies, within the time limit under Rule 32.2(b).

<b>The International Bureau of WIPO</b> 34, chemin des Colombettes 1211 Geneva 20, Switzerland	<b>Authorized officer</b> F. Baechler
Facsimile No.: (41-22) 740.14.35	Telephone No.: (41-22) 338.83.38

## PATENT COOPERATION TREATY

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REC'D 27 NOV 2000

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## INTERNATIONAL PRELIMINARY EXAMINATION REPORT

(PCT Article 36 and Rule 70)

15

Applicant's or agent's file reference E-5629/98 Bis	<b>FOR FURTHER ACTION</b> See Notification of Transmittal of International Preliminary Examination Report (Form PCT/IPEA/416)	
International application No. PCT/EP99/07505	International filing date (day/month/year) 06/10/1999	Priority date (day/month/year) 07/10/1998
International Patent Classification (IPC) or national classification and IPC B65B9/20		
Applicant TETRA LAVAL HOLDINGS & FINANCE SA et al.		



1. This international preliminary examination report has been prepared by this International Preliminary Examining Authority and is transmitted to the applicant according to Article 36.

2. This REPORT consists of a total of 4 sheets, including this cover sheet.

☐ This report is also accompanied by ANNEXES, i.e. sheets of the description, claims and/or drawings which have been amended and are the basis for this report and/or sheets containing rectifications made before this Authority (see Rule 70.16 and Section 607 of the Administrative Instructions under the PCT).

These annexes consist of a total of sheets.

3. This report contains indications relating to the following items:
- I ☒ Basis of the report
  - II ☐ Priority
  - III ☐ Non-establishment of opinion with regard to novelty, inventive step and industrial applicability
  - IV ☐ Lack of unity of invention
  - V ☒ Reasoned statement under Article 35(2) with regard to novelty, inventive step or industrial applicability; citations and explanations supporting such statement
  - VI ☐ Certain documents cited
  - VII ☐ Certain defects in the international application
  - VIII ☐ Certain observations on the international application

Date of submission of the demand 03/05/2000	Date of completion of this report 23.11.2000
Name and mailing address of the international preliminary examining authority:  European Patent Office D-80298 Munich Tel. +49 89 2399 - 0 Tx: 523656 epmu d Fax: +49 89 2399 - 4465	Authorized officer Schelle, J Telephone No. +49 89 2399 2612 

# INTERNATIONAL PRELIMINARY EXAMINATION REPORT

International application No. PCT/EP99/07505

## I. Basis of the report

1. This report has been drawn on the basis of *(substitute sheets which have been furnished to the receiving Office in response to an invitation under Article 14 are referred to in this report as "originally filed" and are not annexed to the report since they do not contain amendments (Rules 70.16 and 70.17).):*

### Description, pages:

1-19 as originally filed

### Claims, No.:

1-14 as originally filed

### Drawings, sheets:

1/6-6/6 as originally filed

2. With regard to the **language**, all the elements marked above were available or furnished to this Authority in the language in which the international application was filed, unless otherwise indicated under this item.

These elements were available or furnished to this Authority in the following language: , which is:

- ☐ the language of a translation furnished for the purposes of the international search (under Rule 23.1(b)).
- ☐ the language of publication of the international application (under Rule 48.3(b)).
- ☐ the language of a translation furnished for the purposes of international preliminary examination (under Rule 55.2 and/or 55.3).

3. With regard to any **nucleotide and/or amino acid sequence** disclosed in the international application, the international preliminary examination was carried out on the basis of the sequence listing:

- ☐ contained in the international application in written form.
- ☐ filed together with the international application in computer readable form.
- ☐ furnished subsequently to this Authority in written form.
- ☐ furnished subsequently to this Authority in computer readable form.
- ☐ The statement that the subsequently furnished written sequence listing does not go beyond the disclosure in the international application as filed has been furnished.
- ☐ The statement that the information recorded in computer readable form is identical to the written sequence listing has been furnished.

4. The amendments have resulted in the cancellation of:

- ☐ the description, pages:
- ☐ the claims, Nos.:

**INTERNATIONAL PRELIMINARY  
EXAMINATION REPORT**

International application No. PCT/EP99/07505

☐ the drawings, sheets:

5. ☐ This report has been established as if (some of) the amendments had not been made, since they have been considered to go beyond the disclosure as filed (Rule 70.2(c)):

*(Any replacement sheet containing such amendments must be referred to under item 1 and annexed to this report.)*

6. Additional observations, if necessary:

**V. Reasoned statement under Article 35(2) with regard to novelty, inventive step or industrial applicability; citations and explanations supporting such statement**

**1. Statement**

Novelty (N)	Yes:	Claims	2, 3, 5-14
	No:	Claims	1, 4
Inventive step (IS)	Yes:	Claims	combination 4+6+9+10; 7,8,11-13 (if dependent on said combination)
	No:	Claims	1-5, 14
Industrial applicability (IA)	Yes:	Claims	1-14
	No:	Claims	

**2. Citations and explanations  
see separate sheet**

**INTERNATIONAL PRELIMINARY  
EXAMINATION REPORT - SEPARATE SHEET**

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International application No. PCT/EP99/07505

**Re Item V**

**Reasoned statement under Rule 66.2(a)(ii) with regard to novelty, inventive step or industrial applicability; citations and explanations supporting such statement**

1. Reference is made to the following documents:

D1: US 4 109 792 A

D2: US 4 637 199 A

2. The present application does not meet the criteria of Article 33(1) PCT, because the respective subject-matter of claims 1 and 4 is not new in the sense of Article 33(2) PCT.

Document D1 clearly discloses a method/package unit having all of the features included in claim 1 and 4 respectively.

In particular, in the known method/unit the cutting operation is being performed **before** the sealing operation (see D1, col. 14, lines 4-14).

3. The present application does not meet the criteria of Article 33(1) PCT, because the respective subject-matter of claims 2, 5 and 14 does not involve an inventive step in the sense of Article 33(3) PCT.

Given the facts that sealing the packaging material by inducing is well-known in the art (see the description of the present application, page 3, line 23 to page 4, line 24 and document D2) and that the sealing jaws used for this purpose normally have "two elongated active surfaces", the respective subject-matter of said claims 2 and 5 results from a normal design step.

Sealing the full height of a package's transverse sealing region completely (claim 14) is an obvious design option.

4. In view of the available prior art only the combination of the features of claims 10, 9, 6 and 4 can be regarded as defining inventive subject-matter.

demand must be filed directly with the competent International Preliminary Examining Authority or two or more Authorities are competent, with the one chosen by the applicant. The full name or two-letter code of that Authority may be indicated by the applicant on the line below:

IPEA/EP

# PCT

## CHAPTER II

### DEMAND

under Article 31 of the Patent Cooperation Treaty:  
The undersigned requests that the international application specified below be the subject of international preliminary examination according to the Patent Cooperation Treaty and hereby elects all eligible States (except where otherwise indicated).

For International Preliminary Examining Authority use only

Identification of IPEA		Date of receipt of DEMAND	
<b>Box No. I IDENTIFICATION OF THE INTERNATIONAL APPLICATION</b>		Applicant's or agent's file reference E-5629/98BIS	
International application No. PCT/EP99/07505	International filing date (day/month/year) (6 October 1999) 6.10.99	(Earliest) Priority date (day/month/year) (7 October 1998) 7.10.98	
Title of invention METHOD OF PRODUCING SEALED PACKAGES CONTAINING POURABLE FOOD PRODUCTS FROM A TUBE OF PACKING MATERIAL, AND PACKING UNIT IMPLEMENTING SUCH A METHOD			
<b>Box No. II APPLICANT(S)</b>			
Name and address: (Family name followed by given name; for a legal entity, full official designation. The address must include postal code and name of country.)  TETRA LAVAL HOLDINGS & FINANCE SA  Avenue Général-Guisan, 70 CH-1009 PULLY, Switzerland		Telephone No.: ===	
		Facsimile No.: ===	
		Teleprinter No.: ===	
State (that is, country) of nationality: CH		State (that is, country) of residence: CH	
Name and address: (Family name followed by given name; for a legal entity, full official designation. The address must include postal code and name of country.)  BENEDETTI Paolo  Via Mälåtesta, 21 41100 MODENA, Italy			
State (that is, country) of nationality: IT		State (that is, country) of residence: IT	
Name and address: (Family name followed by given name; for a legal entity, full official designation. The address must include postal code and name of country.)  SELBERG Hans  Älgskytteväg 7 S-222 53 LUND, Sweden			
State (that is, country) of nationality: SE		State (that is, country) of residence: SE	
<input type="checkbox"/> Further applicants are indicated on a continuation sheet.			

**Box No. III AGENT OR COMMON REPRESENTATIVE; OR ADDRESS FOR CORRESPONDENCE**The following person is ☒ agent ☐ common representativeand ☒ has been appointed earlier and represents the applicant(s) also for international preliminary examination.☐ is hereby appointed and any earlier appointment of (an) agent(s)/common representative is hereby revoked.☐ is hereby appointed, specifically for the procedure before the International Preliminary Examining Authority, in addition to the agent(s)/common representative appointed earlier.Name and address: *(Family name followed by given name; for a legal entity, full official designation. The address must include postal code and name of country.)*JORIO Paolo - PRATO Roberto - BOGGIO Luigi -  
PLEBANI Rinaldo - CERBARO Elena - FRANZOLIN Luigi -  
LO CIGNO Giovannic/o STUDIO TORTA S.r.l.  
Via Viotti, 9  
10121 TORINO, Italy

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+39.011.5611320

Facsimile No.:

+39.011.5622102

Teleprinter No.:

221612

☐ **Address for correspondence:** Mark this check-box where no agent or common representative is/has been appointed and the space above is used instead to indicate a special address to which correspondence should be sent.**Box No. IV BASIS FOR INTERNATIONAL PRELIMINARY EXAMINATION****Statement concerning amendments:\***

1. The applicant wishes the international preliminary examination to start on the basis of:

☒ the international application as originally filed

the description

☐ as originally filed☐ as amended under Article 34

the claims

☐ as originally filed☐ as amended under Article 19 (together with any accompanying statement)☐ as amended under Article 34

the drawings

☐ as originally filed☐ as amended under Article 342. ☐ The applicant wishes any amendment to the claims under Article 19 to be considered as reversed.3. ☐ The applicant wishes the start of the international preliminary examination to be postponed until the expiration of 20 months from the priority date unless the International Preliminary Examining Authority receives a copy of any amendments made under Article 19 or a notice from the applicant that he does not wish to make such amendments (Rule 69.1(d)). *(This check-box may be marked only where the time limit under Article 19 has not yet expired.)*

\* Where no check-box is marked, international preliminary examination will start on the basis of the international application as originally filed or, where a copy of amendments to the claims under Article 19 and/or amendments of the international application under Article 34 are received by the International Preliminary Examining Authority before it has begun to draw up a written opinion or the international preliminary examination report, as so amended.

**Language for the purposes of international preliminary examination:** English☒ which is the language in which the international application was filed.☐ which is the language of a translation furnished for the purposes of international search.☐ which is the language of publication of the international application.☐ which is the language of the translation (to be) furnished for the purposes of international preliminary examination.**Box No. V ELECTION OF STATES**The applicant hereby elects all eligible States *(that is, all States which have been designated and which are bound by Chapter II of the PCT)*

excluding the following States which the applicant wishes not to elect:

**Box No. VI CHECK LIST**

The demand is accompanied by the following elements, in the language referred to in Box No. IV, for the purposes of international preliminary examination:

- |  |   |        |
|--|---|--------|
| 1. translation of international application                              | : | sheets |
| 2. amendments under Article 34   | : | sheets |
| 3. copy (or, where required, translation) of amendments under Article 19 | : | sheets |
| 4. copy (or, where required, translation) of statement under Article 19  | : | sheets |
| 5. letter  | : | sheets |
| 6. other ( <i>specify</i> )  | : | sheets |

For International Preliminary  
Examining Authority use only

received                      not received

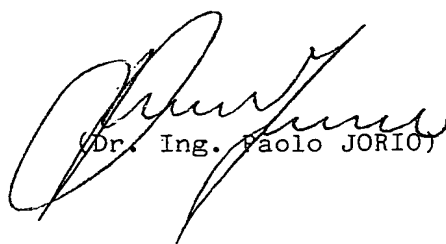
<input type="checkbox"/>	<input type="checkbox"/>
<input type="checkbox"/>	<input type="checkbox"/>
<input type="checkbox"/>	<input type="checkbox"/>
<input type="checkbox"/>	<input type="checkbox"/>
<input type="checkbox"/>	<input type="checkbox"/>
<input type="checkbox"/>	<input type="checkbox"/>

The demand is also accompanied by the item(s) marked below:

- |  |   |
|--|---|
| 1. <input checked="" type="checkbox"/> fee calculation sheet                             | 4. <input type="checkbox"/> statement explaining lack of signature                                  |
| 2. <input type="checkbox"/> separate signed power of attorney                            | 5. <input type="checkbox"/> nucleotide and or amino acid sequence listing in computer readable form |
| 3. <input type="checkbox"/> copy of general power of attorney; reference number, if any: | 6. <input type="checkbox"/> other ( <i>specify</i> ):   |

**Box No. VII SIGNATURE OF APPLICANT, AGENT OR COMMON REPRESENTATIVE**

Next to each signature, indicate the name of the person signing and the capacity in which the person signs (if such capacity is not obvious from reading the demand).

  
(Dr. Ing. Paolo JORIO)

For International Preliminary Examining Authority use only

1. Date of actual receipt of DEMAND:

2. Adjusted date of receipt of demand due to CORRECTIONS under Rule 60.1(b):

3. ☐ The date of receipt of the demand is AFTER the expiration of 19 months from the priority date and item 4 or 5, below, does not apply.

☐ The applicant has been informed accordingly.

4. ☐ The date of receipt of the demand is WITHIN the period of 19 months from the priority date as extended by virtue of Rule 80.5.

5. ☐ Although the date of receipt of the demand is after the expiration of 19 months from the priority date, the delay in arrival is EXCUSED pursuant to Rule 82.

For International Bureau use only

Demand received from IPEA on:



# PATENT COOPERATION TREATY

# PCT

## INTERNATIONAL SEARCH REPORT

(PCT Article 18 and Rules 43 and 44)

Applicant's or agent's file reference <b>E-5629/98 Bis</b>	<b>FOR FURTHER ACTION</b> <small>see Notification of Transmittal of International Search Report (Form PCT/ISA/220) as well as, where applicable, item 5 below.</small>	
International application No. <b>PCT/EP 99/ 07505</b>	International filing date (day/month/year) <b>06/10/1999</b>	(Earliest) Priority Date (day/month/year) <b>07/10/1998</b>
Applicant  <b>TETRA LAVAL HOLDINGS &amp; FINANCE SA et al.</b>		

This International Search Report has been prepared by this International Searching Authority and is transmitted to the applicant according to Article 18. A copy is being transmitted to the International Bureau.

This International Search Report consists of a total of 3 sheets.



It is also accompanied by a copy of each prior art document cited in this report.

**1. Basis of the report**

- a. With regard to the **language**, the international search was carried out on the basis of the international application in the language in which it was filed, unless otherwise indicated under this item.



the international search was carried out on the basis of a translation of the international application furnished to this Authority (Rule 23.1(b)).

- b. With regard to any **nucleotide and/or amino acid sequence** disclosed in the international application, the international search was carried out on the basis of the sequence listing:



contained in the international application in written form.



filed together with the international application in computer readable form.



furnished subsequently to this Authority in written form.



furnished subsequently to this Authority in computer readable form.



the statement that the subsequently furnished written sequence listing does not go beyond the disclosure in the international application as filed has been furnished.



the statement that the information recorded in computer readable form is identical to the written sequence listing has been furnished

2. ☐ **Certain claims were found unsearchable** (See Box I).

3. ☐ **Unity of invention is lacking** (see Box II).

**4. With regard to the title,**



the text is approved as submitted by the applicant.



the text has been established by this Authority to read as follows:

**5. With regard to the abstract,**



the text is approved as submitted by the applicant.



the text has been established, according to Rule 38.2(b), by this Authority as it appears in Box III. The applicant may, within one month from the date of mailing of this international search report, submit comments to this Authority.

**6. The figure of the drawings to be published with the abstract is Figur No.**



as suggested by the applicant.



because the applicant failed to suggest a figure.



because this figure better characterizes the invention.

4



None of the figures.

# INTERNATIONAL SEARCH REPORT

International Application No

PCT/EP 99/07505

**A. CLASSIFICATION OF SUBJECT MATTER**  
IPC 7 B65B9/20 B65B51/30

According to International Patent Classification (IPC) or to both national classification and IPC

**B. FIELDS SEARCHED**

Minimum documentation searched (classification system followed by classification symbols)

IPC 7 B65B B29C

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched

Electronic data base consulted during the international search (name of data base and, where practical, search terms used)

**C. DOCUMENTS CONSIDERED TO BE RELEVANT**

Category *	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
X	US 5 755 076 A (OTSUKA YUZO) 26 May 1998 (1998-05-26)	1,2,7
Y	figures 3-5	4,6,11, 12
X	US 4 109 792 A (GREENAWALT EDDIE LEE ET AL) 29 August 1978 (1978-08-29)	1,5
Y	figures 1,18,20-26	4-6,8-12
Y	US 4 637 199 A (STECK ROBERT F ET AL) 20 January 1987 (1987-01-20)	4,5,8-11
	figures 6-9	
A	EP 0 460 540 A (TETRA PAK HOLDINGS SA) 11 December 1991 (1991-12-11) the whole document	1,5
	-/--	

☒ Further documents are listed in the continuation of box C.

☒ Patent family members are listed in annex.

\* Special categories of cited documents :

"A" document defining the general state of the art which is not considered to be of particular relevance

"E" earlier document but published on or after the international filing date

"L" document which may throw doubts on priority claim(s) or which is cited to establish the publication date of another citation or other special reason (as specified)

"O" document referring to an oral disclosure, use, exhibition or other means

"P" document published prior to the international filing date but later than the priority date claimed

"T" later document published after the international filing date or priority date and not in conflict with the application but cited to understand the principle or theory underlying the invention

"X" document of particular relevance; the claimed invention cannot be considered novel or cannot be considered to involve an inventive step when the document is taken alone

"Y" document of particular relevance; the claimed invention cannot be considered to involve an inventive step when the document is combined with one or more other such documents, such combination being obvious to a person skilled in the art.

"&" document member of the same patent family

Date of the actual completion of the international search

11 February 2000

Date of mailing of the international search report

22/02/2000

Name and mailing address of the ISA

European Patent Office, P.B. 5818 Patentlaan 2  
NL - 2280 HV Rijswijk  
Tel. (+31-70) 340-2040, Tx. 31 651 epo nl,  
Fax: (+31-70) 340-3016

Authorized officer

Béraud, F

# INTERNATIONAL SEARCH REPORT

International Application No  
PCT/EP 99/07505

## C.(Continuation) DOCUMENTS CONSIDERED TO BE RELEVANT

Category	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
P, X	EP 0 887 269 A (TETRA LAVAL HOLDINGS & FINANCE) 30 December 1998 (1998-12-30) column 1, line 11 - line 22 column 4, line 52 - column 5, line 32; figures 3,4,8 -----	1-11

# INTERNATIONAL SEARCH REPORT

Information on patent family members

International Application No

PCT/EP 99/07505

Patent document cited in search report		Publication date	Patent family member(s)	Publication date
US 5755076	A	26-05-1998	JP 6321222 A AT 170146 T AU 676048 B AU 6689794 A DE 69412812 D DE 69412812 T EP 0695691 A WO 9426597 A	22-11-1994 15-09-1998 27-02-1997 12-12-1994 01-10-1998 14-01-1999 07-02-1996 24-11-1994
US 4109792	A	29-08-1978	NONE	
US 4637199	A	20-01-1987	CA 1265030 A US RE33467 E	30-01-1990 04-12-1990
EP 0460540	A	11-12-1991	SE 466306 B AT 118419 T AU 634886 B AU 7815991 A CA 2043098 A CN 1057033 A, B CS 9101732 A DE 69107343 D DE 69107343 T DK 460540 T ES 2069119 T GR 3015170 T HU 210501 B JP 5032208 A LT 1822 A, B LV 11143 A LV 11143 B SE 9002019 A RU 2022889 C US 5155980 A	27-01-1992 15-03-1995 04-03-1993 12-12-1991 07-12-1991 18-12-1991 15-01-1992 23-03-1995 14-06-1995 22-05-1995 01-05-1995 31-05-1995 28-04-1995 09-02-1993 25-08-1995 20-04-1996 20-08-1996 07-12-1991 15-11-1994 20-10-1992
EP 0887269	A	30-12-1998	BR 9802285 A JP 11070921 A	13-10-1999 16-03-1999



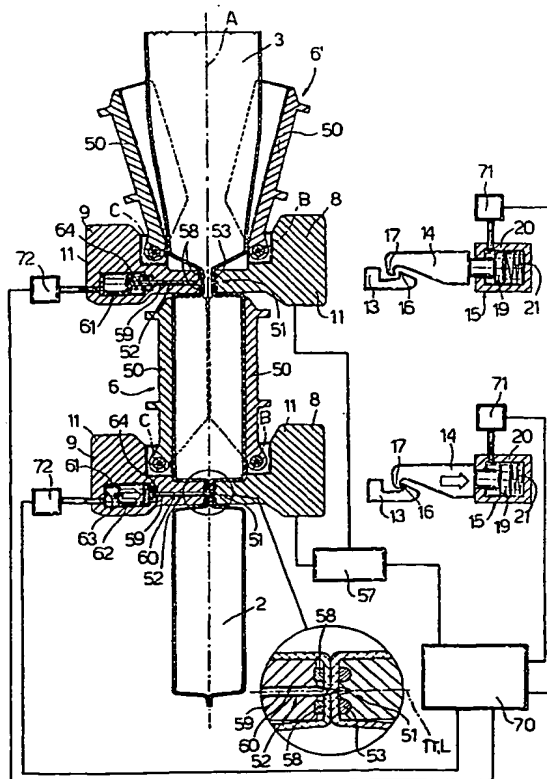
## INTERNATIONAL APPLICATION PUBLISHED UNDER THE PATENT COOPERATION TREATY (PCT)

<b>(51) International Patent Classification <sup>7</sup> :</b> <b>B65B 9/20, 51/30</b>	<b>A1</b>	<b>(11) International Publication Number:</b> <b>WO 00/20279</b> <b>(43) International Publication Date:</b> 13 April 2000 (13.04.00)
<b>(21) International Application Number:</b> PCT/EP99/07505 <b>(22) International Filing Date:</b> 6 October 1999 (06.10.99) <b>(30) Priority Data:</b> 98830588.4      7 October 1998 (07.10.98)      EP <b>(71) Applicant (for all designated States except US):</b> TETRA LAVAL HOLDINGS & FINANCE SA [CH/CH]; 70, avenue Général-Guisan, CH-1009 Pully (CH). <b>(72) Inventors; and</b> <b>(75) Inventors/Applicants (for US only):</b> BENEDETTI, Paolo [IT/IT]; Via Malatesta, 21, I-41100 Modena (IT). SELBERG, Hans [SE/SE]; Älgskytteväg 7, S-222 53 Lund (SE). <b>(74) Agents:</b> JORIO, Paolo et al.; Studio Torta S.r.l., Via Viotti, 9, I-10121 Torino (IT).		<b>(81) Designated States:</b> AE, AL, AM, AT, AU, AZ, BA, BB, BG, BR, BY, CA, CH, CN, CR, CU, CZ, DE, DK, DM, EE, ES, FI, GB, GD, GE, GH, GM, HR, HU, ID, IL, IN, IS, JP, KE, KG, KP, KR, KZ, LC, LK, LR, LS, LT, LU, LV, MD, MG, MK, MN, MW, MX, NO, NZ, PL, PT, RO, RU, SD, SE, SG, SI, SK, SL, TJ, TM, TR, TT, UA, UG, US, UZ, VN, YU, ZA, ZW, ARIPO patent (GH, GM, KE, LS, MW, SD, SL, SZ, TZ, UG, ZW), Eurasian patent (AM, AZ, BY, KG, KZ, MD, RU, TJ, TM), European patent (AT, BE, CH, CY, DE, DK, ES, FI, FR, GB, GR, IE, IT, LU, MC, NL, PT, SE), OAPI patent (BF, BJ, CF, CG, CI, CM, GA, GN, GW, ML, MR, NE, SN, TD, TG).  <b>Published</b> With international search report. Before the expiration of the time limit for amending the claims and to be republished in the event of the receipt of amendments.

**(54) Title:** METHOD OF PRODUCING SEALED PACKAGES CONTAINING POURABLE FOOD PRODUCTS FROM A TUBE OF PACKING MATERIAL, AND PACKING UNIT IMPLEMENTING SUCH A METHOD

**(57) Abstract**

A method of producing sealed packages (2) containing pourable food products from a tube (3) of heat seal sheet packing material fed along a vertical path (A) and filled continuously with the food product; the method including the steps of pressure gripping equally spaced cross sections of the tube (3) by means of two pairs of jaws (8, 9) acting cyclically and successively on the tube (3); cutting the tube (3), at each of the cross sections, along a respective parting line (L); and then heat sealing the packing material of the tube (3) on opposite sides of the parting line (L).



**FOR THE PURPOSES OF INFORMATION ONLY**

Codes used to identify States party to the PCT on the front pages of pamphlets publishing international applications under the PCT.

AL	Albania	ES	Spain	LS	Lesotho	SI	Slovenia
AM	Armenia	FI	Finland	LT	Lithuania	SK	Slovakia
AT	Austria	FR	France	LU	Luxembourg	SN	Senegal
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AZ	Azerbaijan	GB	United Kingdom	MC	Monaco	TD	Chad
BA	Bosnia and Herzegovina	GE	Georgia	MD	Republic of Moldova	TG	Togo
BB	Barbados	GH	Ghana	MG	Madagascar	TJ	Tajikistan
BE	Belgium	GN	Guinea	MK	The former Yugoslav Republic of Macedonia	TM	Turkmenistan
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BJ	Benin	IE	Ireland	MR	Mauritania	UA	Ukraine
BR	Brazil	IL	Israel	MW	Malawi	UG	Uganda
BY	Belarus	IS	Iceland	MX	Mexico	US	United States of America
CA	Canada	IT	Italy	NE	Niger	UZ	Uzbekistan
CF	Central African Republic	JP	Japan	NL	Netherlands	VN	Viet Nam
CG	Congo	KE	Kenya	NO	Norway	YU	Yugoslavia
CH	Switzerland	KG	Kyrgyzstan	NZ	New Zealand	ZW	Zimbabwe
CI	Côte d'Ivoire	KP	Democratic People's Republic of Korea	PL	Poland		
CM	Cameroon	KR	Republic of Korea	PT	Portugal		
CN	China	KZ	Kazakstan	RO	Romania		
CU	Cuba	LC	Saint Lucia	RU	Russian Federation		
CZ	Czech Republic	LI	Liechtenstein	SD	Sudan		
DE	Germany	LK	Sri Lanka	SE	Sweden		
DK	Denmark	LR	Liberia	SG	Singapore		
EE	Estonia						

5

METHOD OF PRODUCING SEALED PACKAGES CONTAINING POURABLE  
FOOD PRODUCTS FROM A TUBE OF PACKING MATERIAL, AND  
PACKING UNIT IMPLEMENTING SUCH A METHOD

10

#### TECHNICAL FIELD

The present invention relates to a method of  
producing sealed packages containing pourable food  
products from a tube of packing material, and a packing  
15 unit implementing such a method.

#### BACKGROUND ART

Many pourable food products, such as fruit juice,  
pasteurized or UHT (ultra-high-temperature treated) milk,  
wine, tomato sauce, etc., are sold in packages made of  
20 sterilized packing material.

A typical example of such a package is the  
parallelepiped packing container for liquid or pourable  
food products known by the name of Tetra Brik Aseptic  
(registered trademark), which is formed by folding and  
25 sealing a strip-rolled packing material. The rolled  
packing material comprises layers of fibrous material,  
e.g. paper, covered on both sides with heat seal plastic  
material, e.g. polyethylene.

For aseptic packing of long-storage products, such as UHT milk, the packing material comprises a layer of barrier material, e.g. an aluminium sheet, which is superimposed on the layer of heat seal plastic material and is in turn covered with another layer of heat seal plastic material forming the inner face of the package actually contacting the food product.

As is known, packages of the above type are produced on fully automatic packing machines, on which a continuous tube is formed from the packing material supplied in strip form. The strip of packing material is sterilized on the packing machine, e.g. by applying a chemical sterilizing agent, such as a hydrogen peroxide solution; following sterilization, the sterilizing agent is removed, e.g. vaporized by heating, from the surfaces of the packing material; and the strip of packing material so sterilized is kept in a closed sterile environment, and is folded and sealed longitudinally to form a tube.

The tube is filled with the sterilized or sterile-processed food product, and is gripped at equally spaced cross sections by two pairs of jaws, which operate cyclically and successively on the tube to heat seal the packing material of the tube and form a continuous strip of pillow packs connected to one another by respective transverse sealing bands.

The pillow packs are separated by cutting the respective sealing bands, and are transferred to a final



folding station where they are folded mechanically into the final parallelepiped shape.

Packing units of the above type are known in which the reciprocating movement of the jaws is controlled by a cam system comprising an electric motor, the output shaft of which is fitted, for each pair of jaws, with two cams with appropriately differing profiles. By means of respective lever mechanisms, the cams control the up and down movement of a supporting slide to which a respective pair of jaws is hinged, and the reciprocating opening and closing movement of the jaws.

Two facing forming tabs are hinged respectively to the jaws in each pair, and are moved between an open position, into which they are pushed by elastic means, and a closed position in which they mate to define a space defining the shape and volume of the package to be formed in between. The forming tabs are closed by cams fixed to the structure of the unit, and which interact with respective rollers carried by the tabs.

The portion of the tube gripped between each pair of jaws is simultaneously heat sealed transversely by induction heating means on the jaws.

More specifically, one of the jaws in each pair comprises a main body made of nonconducting material, and an inductor housed in a front seat on the main body. The inductor is normally supplied by a high-frequency generator, and comprises a bar made of electrically

conducting material and which interacts with the tube material to heat it to the required sealing temperature.

The other jaw in each pair comprises pressure pads made of elastic material and which cooperate with the inductor to heat seal the tube along a respective sealing band.

Once the sealing operation is completed, a knife on one of the jaws in the pair interacting with the tube of packing material is activated to cut the tube along the center of the sealing band and so detach a pillow pack from the bottom end of the tube of packing material. As the bottom end is sealed transversely, the jaws, on reaching the bottom dead center position, can be opened to prevent interfering with the upper portion of the tube. At the same time, the other pair of jaws, operating in exactly the same way, moves down from the top dead center position to repeat the above gripping/forming, sealing and cutting operations.

As stated, the tube of packing material is heat sealed by inducing electric loss current in the aluminium sheet, which current melts the plastic heat seal material locally when the respective pair of jaws grips the tube, so as to seal a cross section of the tube by heat sealing the plastic coating.

From analysis of the packing material during the heat seal operation, the loss current induced in the cross section of the tube of packing material gripped between each pair of jaws has been found to follow a

closed path, which is linear along the two longitudinal sides of the region in which the inductor interacts with the tube, and is roughly semicircular close to the edges of the cross section. That is, the current flows linearly  
5 in opposite directions along the two longitudinal sides of the region in which the inductor interacts with the tube, and is deflected towards the center of the cross section gripped between the jaws close to the edges of the cross section ("bending-off effect"), so that the  
10 sealing band is narrower at the ends than at the central portion. On the other hand, when packing pourable food products containing small solid particles, such as seeds in tomato products, which may get trapped between the nonsealed portions of the two contacting sheets of  
15 packing material, the sealing band should be as wide as possible to reduce the likelihood of channels forming through the sealed portion.

#### DISCLOSURE OF INVENTION

It is an object of the present invention to provide  
20 a method of producing sealed pourable food product packages from a tube of packing material, designed to eliminate the aforementioned drawbacks typically associated with known methods.

According to the present invention, there are  
25 provided a method of producing sealed packages containing pourable food products from a tube of heat seal sheet packing material, as claimed in Claim 1; a packing unit implementing such a method and as claimed in Claim 4; and

a sealed package containing a pourable food product, produced using such a method, and as claimed in Claim 14.

#### BRIEF DESCRIPTION OF THE DRAWINGS

A preferred, non-limiting embodiment of the present invention will be described by way of example with reference to the accompanying drawings, in which:

Figure 1 shows a view in perspective, with parts removed for clarity, of a packing unit for producing aseptic sealed packages containing pourable food products from a tube of packing material and according to the method of the present invention;

Figure 2 shows a side view, with parts removed for clarity, of the Figure 1 unit;

Figure 3 shows a side view of the Figure 2 unit in a different operating configuration;

Figures 4 to 6 show larger-scale side views of two forming assemblies of the Figure 1 unit at various stages in the processing of the tube of packing material:

Figure 7 shows a larger-scale section of an induction heating element of the Figure 4-6 forming assemblies;

Figure 8 shows a larger-scale section of a variation of the Figure 7 induction heating element.

#### BEST MODE FOR CARRYING OUT THE INVENTION

Number 1 in Figures 1 to 3 indicates as a whole a packing unit for producing, from a tube 3 of packing material, aseptic sealed packages 2 (Figures 4 to 6)

containing a pourable food product, such as pasteurized or UHT milk, fruit juice, wine, etc.

The packing material has a multilayer structure (not shown), and comprises a layer of fibrous material, normally paper, covered on both sides with respective layers of heat seal plastic material, e.g. polyethylene. The side of the packing material eventually contacting the food product in package 2 also comprises a layer of electrically conductive barrier material, e.g. aluminium, in turn covered with one or more layers of heat seal plastic material.

Tube 3 is formed in known manner upstream from unit 1 by longitudinally folding and sealing a strip of heat seal strip material, is filled with the sterilized or sterile-processed food product for packaging, and is fed by known devices (not shown) along a vertical path defined by an axis A.

Unit 1 comprises a supporting structure 4 defining a pair of cylindrical vertical guides 5, 5' located symmetrically with respect to the longitudinal vertical mid-plane  $\alpha$  of unit 1 through axis A (Figure 1).

With reference to Figures 1 to 6, unit 1 comprises in known manner a pair of forming assemblies 6, 6' movable vertically along respective guides 5, 5' and which interact cyclically and successively with tube 3 of packing material to grip equally spaced cross sections of the tube and perform cutting and heat seal operations on tube 3 as described in detail later on.

As assemblies 6, 6' are known and symmetrical with respect to plane  $\alpha$ , only one (assembly 6) will be described, and only as regards the parts pertinent to the present invention. The corresponding parts of assemblies 5 6, 6' are indicated in the drawings using the same numbering system.

Assembly 6 substantially comprises a slide 7 movable along respective guide 5; and a pair of jaws 8, 9 defined, in the example shown, by substantially L-shaped 10 plates, which are hinged at the bottom to slide 7 about respective horizontal axes B, C perpendicular to plane  $\alpha$ , and are movable between a closed position (Figures 2, 4, 5) and a fully-open position (Figure 3).

More specifically, each jaw 8, 9 comprises a 15 substantially quadrangular base portion 10 hinged at the bottom end to a bottom portion of slide 7; and an arm 11 for interacting with tube 3, and which is fixed to the top end of portion 10 and projects from portion 10 in a direction perpendicular to plane  $\alpha$ . Arms 11 of jaws 8, 9 20 extend towards and beyond plane  $\alpha$  on opposite sides of tube 3.

At respective portions 10, jaws 8, 9 comprise respective integral transmission members 12 in the form of sector gears, which mesh with each other so that the 25 rotation of one of jaws 8, 9 about respective axis B, C is transmitted in the opposite direction to the other jaw 9, 8.

Assembly 6 also comprises a first hook element 13 integral with portion 10 of one (9) of the jaws; a second hook element 14 hinged to portion 10 of the other jaw (8) about an axis D parallel to axes B, C; and a hydraulic  
5 cylinder 15 for engaging hook elements 13 and 14 tightly in an engaged position corresponding to the closed position of jaws 8, 9 about tube 3.

More specifically, hook elements 13 and 14 are mutually engaged by means of respective teeth 16 and 17.  
10 Cylinder 15 comprises a piston 19 extending integrally from hook element 14 at the opposite end to hook element 13, and which slides in sealed manner inside an outer jacket 20 and is normally pushed towards hook element 13 by a spring 21 housed inside jacket 20, so that, when  
15 disconnecting hook elements 13 and 14, a minimum clearance is maintained between and to disengage teeth 16 and 17 (Figures 4 and 5 relative to assembly 6'). When oil under pressure is fed into jacket 20 through an inlet in cylinder 15, spring 21 is compressed to engage teeth  
20 16 and 17 tightly (Figures 4 and 5 relative to assembly 6, and Figure 6 relative to assembly 6').

Jaws 8, 9 are therefore movable vertically by slide 7 moving along guide 5, and also perform an opening and closing movement about tube 3 of packing material by  
25 rotating about respective hinge axes B, C between the jaws and slide 7. The opening and closing movement is superimposed on the up and down vertical movement of slide 7.

The vertical movement and the opening and closing movement are controlled respectively by a first and second known cam actuating device 25, 26.

With reference to Figures 1 to 3, actuating device  
5 25 comprises a cam 27 rotating about a respective axis E parallel to axes B, C, D; a substantially vertical lever 28 hinged at the bottom to a top portion of slide 7; and a substantially horizontal rocker arm lever 29, which is located over cam 27, is hinged at opposite ends to lever  
10 28 and to structure 4, and cooperates with the outer profile of cam 27 by means of a respective intermediate idle roller 30.

Rocker arm levers 29 of assemblies 6, 6' are also connected to each other and to structure 4 by a lever  
15 mechanism 31, so that rollers 30 of rocker arm levers 29 are kept contacting respective cams 27 at all times. Lever mechanism 31 comprises a pair of substantially vertical rods 32 hinged at the top to respective rocker arm levers 29, and at the bottom to a transverse lever 33  
20 in turn hinged centrally to structure 4 about an axis perpendicular to axes A, B, C, D. More specifically, each rod 32 is hinged to respective rocker arm lever 29 in an intermediate position between respective roller 30 and respective lever 28.

25 Actuating device 26 comprises a cam 35 having an axis E and defining, on the outer face, a first and second annular groove 36, 37 having appropriately differing profiles, and which, by means of respective



lever mechanisms 38, 39, respectively control the rotation of jaws 8, 9 about axes B, C and the engagement and release movement of teeth 16 and 17 of hook elements 13 and 14.

5 More specifically, lever mechanism 38 comprises a substantially vertical first rod 40 hinged at the top end to structure 4 and supporting a projecting idle roller 41 engaging in rolling manner groove 36 of cam 35; and a second rod 42 extending parallel to plane  $\alpha$  and  
10 crosswise to axis A, and hinged at opposite ends to jaw 8 about axis D, and to the bottom end of rod 40.

Lever mechanism 39 comprises a substantially vertical first rod 43 hinged at the top end to structure 4 and supporting a projecting idle roller 44 engaging in  
15 rolling manner groove 37 of cam 35; and a tubular second rod 45 fitted in axially-sliding manner on rod 42 and hinged at opposite ends, by means of respective connecting rods 46, 47, to the bottom end of rod 43 and to hook element 14, at a point below axis D.

20 Since, as stated previously, the vertical movement of slide 7 and the opening and closing movement of jaws 8, 9 are superimposed, lever 28 moves reciprocatingly, while rods 42 and 45 perform a periodic movement resulting from the combination of the reciprocating  
25 movement of lever 28 and a further component of periodic motion for opening and closing jaws 8, 9.

With reference to Figures 2 to 6, assembly 6 also comprises two mutually facing forming tabs 50 hinged to

respective jaws 8, 9 and movable between an open position (Figure 2), into which they are pushed by elastic means (not shown), and a closed position (Figures 4 and 5) in which they mate to define a space defining the shape and volume of the package 2 to be formed in between. Tabs 50 are closed by known cams (not shown) fixed to structure 4 of unit 1, and which interact with respective rollers (not shown) on tabs 50.

With reference to Figures 4 to 7, assembly 6 also comprises a sealing device 51 and a cutting device 52, which, for each cross section of tube 3 of packing material gripped between respective jaws 8 and 9, provide respectively for heat sealing the cross section and cutting along a respective middle parting line L.

With reference to Figures 4 and 7 in particular, device 51 comprises a substantially U-shaped induction heating element 53 housed in a similarly shaped front groove 54 formed in arm 11 of jaw 8.

Heating element 53 has a substantially ring-shaped cross section; an inner cavity for the passage of coolant; and a pair of straight, elongated active surfaces 55, which interact with tube 3 and extend on opposite sides of and parallel to an intermediate plane  $\pi$  perpendicular to axis A and coinciding, in use, with parting line L of the cross section of tube 3 gripped between jaws 8 and 9.

Heating element 53 also comprises a pair of straight longitudinal projections 56 projecting from

respective active surfaces 55 towards jaw 9, extending substantially the whole length of active surfaces 55, and which, during heat sealing, provide for increasing the gripping pressure on tube 3.

5 Heating element 53 is supplied in known manner by an electric current generator 57 shown schematically in Figures 4 to 6.

Device 51 also comprises a pair of pressure pads 58 (Figure 4), which are normally made of elastic material,  
10 are fitted to the front of jaw 9, and cooperate with respective active surfaces 55 of heating element 53 to grip and heat seal tube 3 on opposite sides of plane  $\pi$ .

With reference to Figures 4 to 6, device 52 comprises a substantially flat cutting element 59 housed  
15 in sliding manner in a front seat 60 on jaw 9 and movable in a direction perpendicular to plane  $\alpha$ ; and a hydraulic cylinder 61 for activating cutting element 59 and built into jaw 9.

More specifically, cylinder 61 comprises a piston  
20 62 integral with cutting element 59 and movable inside a chamber 63 formed in the body of jaw 9 and communicating on one side with seat 60 and on the opposite side with a pressurized oil inlet. Cutting element 59 is normally maintained in a withdrawn idle position, fully housed  
25 inside seat 60 (Figures 5 and 6), by a spring 64 housed inside chamber 63 and interposed between piston 62 and a wall separating chamber 63 from seat 60, and is moved by pressurized oil into a forward cutting position (Figure

4) projecting frontwards from jaw 9 and cooperating with a cavity in jaw 8.

Unit 1 also comprises a central control unit 70 (Figures 4 to 6) connected to generator 57 and to  
5 cylinders 15, 61 via the interposition of respective known solenoid valves 71, 72 shown schematically with no indication of the supply, discharge or drive ports.

According to the present invention, central control unit 70 provides, when tube 3 is gripped by each pair of  
10 jaws 8, 9, for controlling respective generator 57 and the control cylinder 61 of respective cutting element 59 according to a predetermined program memorized in unit 70 itself, so as to first cut the cross section of tube 3 gripped between jaws 8 and 9 along the parting line L,  
15 and then heat seal the packing material of tube 3 on opposite sides of parting line L.

Operation of unit 1, which is partly self-explanatory from the above description, is as follows.

As each assembly 6, 6' travels downwards, jaws 8  
20 and 9 of assembly 6, 6' move into the closed position to grip tube 3 with a downward vertical component of motion equal to the traveling speed of tube 3. As they travel downwards, jaws 8 and 9 are kept closed and grip tube 3 tightly by central control unit 70 activating cylinder  
25 15, and in particular by the movement of piston 19 engaging teeth 16 and 17 of hook elements 13 and 14 and so gripping jaws 8 and 9.

- 15 -

At this stage, central control unit 70 activates cylinder 61 to move cutting element 59 from the withdrawn to the forward position to cut the cross section of tube 3 of packing material gripped between jaws 8 and 9 along parting line L (Figure 4).

Once cylinder 61 is deactivated, and hence cutting element 59 restored to the withdrawn position by spring 64, central control unit 70 activates generator 57 to supply electric current to heating element 53 and so heat seal tube 3 of packing material on opposite sides of parting line L (Figure 5).

During this stage, heating element 53 melts the plastic heat seal layer of the packing material locally; and the electric current supply to heating element 53 is cut off while maximum pressure is still being exerted by jaws 8 and 9 on tube 3, so that cooling and consequent setting, on which the seal depends, of the plastic layer commence under pressure to ensure perfect sealing of packages 2.

Close to the bottom dead center position, central control unit 70 deactivates cylinder 15 to release hook elements 13 and 14 and so open jaws 8 and 9 - which are opened fully as they travel upwards - and release tube 3 (Figure 6).

The movement of assemblies 6, 6' is obviously offset by half a cycle : assembly 6 with jaws 8, 9 open traveled upwards at the same time assembly 6' with jaws 8, 9 closed travels downwards, so that arms 11 of

assembly 6' pass between arms 11 of assembly 6 with no interference.

Inverting the cutting and heat sealing of tube 3 of packing material as compared with the known methods  
5 described previously alters the path of the loss currents induced in the packing material by heating element 53.

That is, as parting line L formed by cutting element 59 in tube 3 of packing material produces an interruption in the electric continuity of the aluminium  
10 sheet, the electric loss currents induced in the packing material by the two active surfaces 55 of heating element 53 are confined on opposite sides of parting line L. In other words, the electric loss current induced in the packing material by one of active surfaces 55 of heating  
15 element 53 on one side of parting line L tends to move towards the other active surface 55 of heating element 53, but, on account of the interruption produced in the packing material, is forced to close its path on the same side of parting line L.

20 As a result, the sealing area on both sides of parting line L is more or less constant, by eliminating the bending-off effect of the electric loss current close to the edges of the cross section gripped between jaws 8 and 9.

25 The Figure 8 variation relates to an induction heating element 75 similar to heating element 53, but comprising two straight active surfaces 76a, 76b in lieu of each active surface 55.

More specifically, heating element 75 comprises a substantially U-shaped first body 77, which is housed in a similarly shaped front groove 78 formed in arm 11 of jaw 8, has a substantially ring-shaped cross section, and  
5 defines, externally, two active surfaces 76a on opposite sides of plane  $\pi$ .

Heating element 75 also comprises a second body 79, which is defined by a straight bar having a U-shaped cross section and housed in an intermediate recess 80 in  
10 jaw 8, and defines two active surfaces 76b on opposite sides of mid-plane  $\pi$  and interposed between active surfaces 76a.

Like heating element 53, heating element 75 comprises four straight longitudinal projections 81a, 81b, 81c, 81d projecting towards jaw 9 from respective  
15 active surfaces 76a, 76b.

Using heating element 75, the electric loss current induced in the packing material has been found to follow substantially symmetrical closed paths on opposite sides  
20 of parting line L. More specifically, on each side of parting line L, the electric loss current travels linearly along each active surface 76a, 76b of heating element 75, with only a minimum amount of deflection close to the edges of the packing material, and which,  
25 involving only a very small part of the sealing region, is practically negligible. The method according to the present invention has been found by the Applicant to produce sealed pourable food product packages 2 in which

the full height of the transverse sealing region is completely sealed.

As stated above, in known techniques, two contiguous packages are usually sealed transversely along two parallel lines before being separated along line L.

The Applicant, on the other hand, has found it more advantageous to separate the packages unsealed and simply compressed between the sealing and elastic contrasting elements, which provides for expelling the small amount of product compressed between the two projections, and so bringing the two layers of heat seal material even closer together to improve the seal.

Using heating element 53 with two active surfaces 55, the two edges cut by cutting element 59 but still close together may possibly be traversed by currents in opposite directions, thus resulting in short circuiting - also aided by the presence of the usually conductive product - with the surrounding metal masses, and in less than perfectly reliable operation of the packing unit.

Using heating element 75 with four active surfaces 76a, 76b, on the other hand, the problem is eliminated entirely, by the whole of the central conductor (76b, 79) being at the same potential, and by the cutting element 59 penetrating along a line of symmetry of the currents with no possibility of affecting the amplitude or direction of the currents, thus enabling the product to be expelled and improving both sealing and the reliability of the packing unit itself.



Tests conducted by the Applicant have also shown that using heating element 75 with four active surfaces 76a, 76b and at least two projections 81a, 81b, 81c, 81d provides for greatly reducing product leakage from tube 3  
5 of packing material cut prior to heat sealing. Projections 81, 81b, 81c, 81d may be either continuous or segmented.

Clearly, changes may be made to unit 1 as described herein without, however, departing from the scope of the  
10 accompanying Claims.

Though particularly advantageous for sealing packing material by induction of electric current, the method described also applies to other sealing processes.

## CLAIMS

1) A method of producing sealed packages (2) containing pourable food products from a tube (3) of heat seal sheet packing material fed along a vertical path (A) and filled continuously with said food product; said method comprising the steps of:

- pressure gripping equally spaced cross sections of said tube (3) by means of at least two pairs of jaws (8, 9) acting cyclically and successively on the tube (3);

- cutting said tube (3), at each of said cross sections, along a respective parting line (L); and then

- heat sealing the packing material of said tube (3) on opposite sides of said parting line (L).

2) A method of producing sealed packages (2) containing pourable food products from a tube (3) of heat seal sheet packing material fed along a vertical path (A) and filled continuously with said food product; said method comprising the steps of:

- pressure gripping equally spaced cross sections of said tube (3) by means of at least two pairs of jaws (8, 9) acting cyclically and successively on the tube (3);

- cutting said tube (3), at each of said cross sections, along a respective parting line (L); and

- heat sealing the packing material of said tube (3) on opposite sides of said parting line (L);

characterized in that said heat seal step is performed by inducing, on opposite sides of said parting line (L) of said tube (3) of packing material, electric loss currents traveling along substantially symmetrical paths with respect to the parting line (L).

3) A method as claimed in Claim 1 or 2, for aseptic sealed packages (2) made of heat seal packing material comprising at least one layer of electrically conductive barrier material; characterized in that said heat seal step is performed by inducing electric loss current in said packing material of said tube (3).

4) A packing unit (1) for producing sealed packages (2) containing pourable food products from a tube (3) of heat seal sheet packing material fed along a vertical path (A) and filled continuously with said food product, said unit (1) comprising a fixed structure (4); at least two pairs of jaws (8, 9) movable with respect to said structure (4) and acting cyclically and successively on said tube (3) to pressure grip equally spaced cross sections of the tube; and sealing means (51) and cutting means (52) carried by each said pair of jaws (8, 9) to respectively perform, on each said cross section of said tube (3) of packing material gripped between the jaws (8, 9), a heat seal operation and a cutting operation along a respective parting line (L);

characterized by comprising control means (70) for controlling said jaws (8, 9), said sealing means (51) and said cutting means (52) to perform, on said tube (3) of

packing material, first said cutting operation along said parting line (L) and then said heat seal operation on opposite sides of the parting line (L).

5        5) A packing unit (1) for producing sealed packages  
(2) containing pourable food products from a tube (3) of  
heat seal sheet packing material fed along a vertical  
path (A) and filled continuously with said food product,  
said unit (1) comprising a fixed structure (4); at least  
two pairs of jaws (8, 9) movable with respect to said  
10       structure (4) and acting cyclically and successively on  
said tube (3) to pressure grip equally spaced cross  
sections of the tube; and sealing means (51) and cutting  
means (52) carried by each said pair of jaws (8, 9) to  
respectively perform, on each said cross section of said  
15       tube (3) of packing material gripped between the jaws (8,  
9), a heat seal operation and a cutting operation along a  
respective parting line (L); characterized in that said  
sealing means (51) comprise heating means (53, 75) in  
turn comprising, for each pair of said jaws (8, 9), at  
20       least two elongated active surfaces (55, 76a, 76b)  
interacting with each said cross section of said tube (3)  
gripped between the jaws (8, 9), and located on opposite  
sides of the respective said parting line (L).

6) A unit as claimed in Claim 4 or 5, for aseptic  
25       sealed packages (2) made of packing material comprising  
at least one layer of electrically conductive barrier  
material; characterized in that said sealing means (51)  
comprise electric-current-induction heating means (53,

75) carried by one (8) of said jaws (8, 9) in each pair; contrasting means (58) carried by the other (9) of said jaws (8, 9) in said pair and cooperating with said heating means (53, 75); and electric current generating  
5 means (57) for supplying said heating means (53, 75).

7) A unit as claimed in Claim 6, characterized in that said layer of electrically conductive material of said packing material is made of aluminium.

8) A unit as claimed in Claim 6 or 7, characterized  
10 in that said heating means (53, 75) comprise, for each pair of said jaws (8, 9), at least two elongated active surfaces (55, 76a, 76b) interacting with each said cross section of said tube (3) gripped between the jaws (8, 9), and located on opposite sides of the respective said  
15 parting line (L).

9) A unit as claimed in Claim 8, characterized in that said heating means (75) comprise, for each pair of said jaws (8, 9), four elongated said active surfaces (76a, 76b) interacting with each said cross section of  
20 said tube (3) gripped between the jaws (8, 9), and located in pairs on opposite sides of the respective said parting line (L); said active surfaces (76a, 76b) inducing, on opposite sides of said parting line (L) of each said cross section of said tube (3) of packing  
25 material, electric loss currents traveling along substantially symmetrical paths with respect to the parting line (L).

10) A unit as claimed in Claim 8 or 9, characterized in that said heating means (53, 75) comprise, for each said active surface (55, 76a, 76b), a projection (56, 81) projecting frontwards from the active  
5 surface (55, 76a, 76b) and extending substantially the whole length of the active surface.

11) A unit as claimed in any one of Claims 4 to 10, characterized in that said cutting means (52) comprise at least one cutting element (59) carried by one (9) of said  
10 jaws (8, 9) in each pair and movable, with respect to the jaws (8, 9), crosswise to said tube (3) of packing material; and first actuating means (61) for moving said cutting element (59) between an idle position, and a cutting position in which the cutting element projects  
15 frontwards from the respective said jaw (9).

12) A unit as claimed in any one of Claims 4 to 11, characterized by comprising first and second hook means (13, 14) carried by respective said jaws (9, 8) in each pair; and second actuating means (15) for pressure  
20 engaging said first and second hook means (13, 14) in an engaged position corresponding to a closed position of the jaws (8, 9) on said tube (3) of packing material.

13) A unit as claimed in Claim 12, characterized in that said control means comprise a central control unit  
25 (70) connected to said first and second actuating means (61, 15) and to said electric current generator (57).

14) A sealed package (2) containing a pourable food product, produced according to the method defined in

Claims 1, 2 or 3, and comprising a transverse sealing region; characterized in that the full height of said transverse sealing region is sealed completely.

1/6

Fig.1

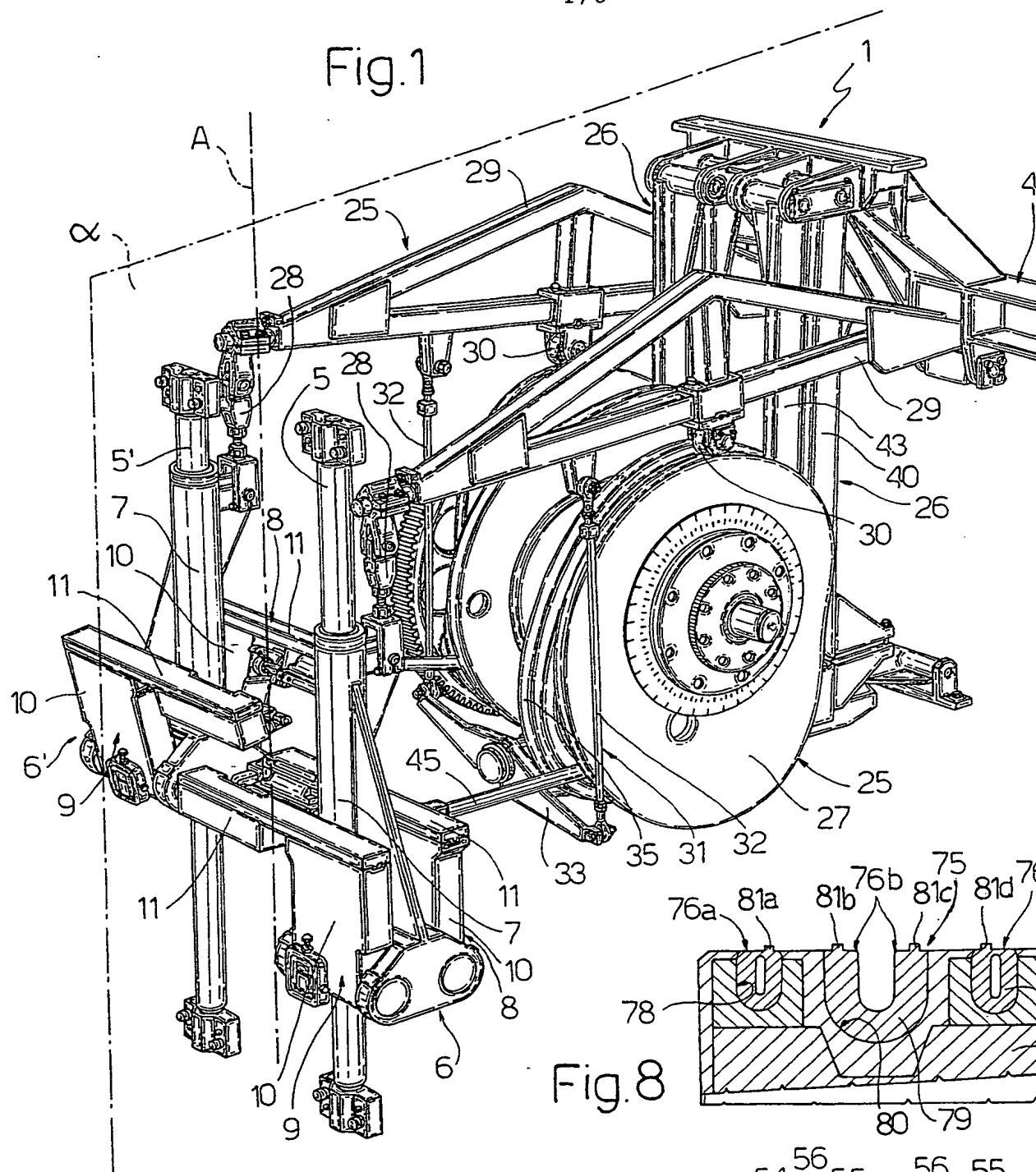


Fig.8

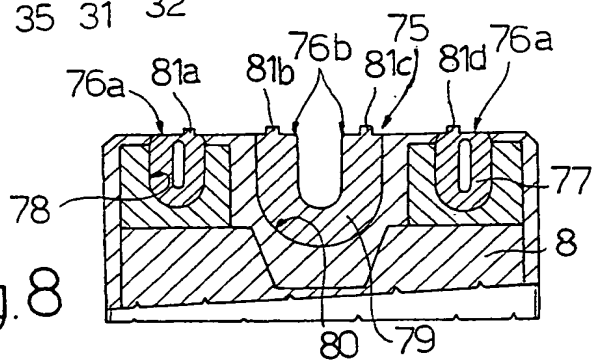


Fig.7

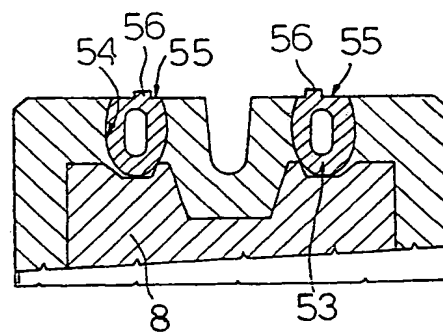
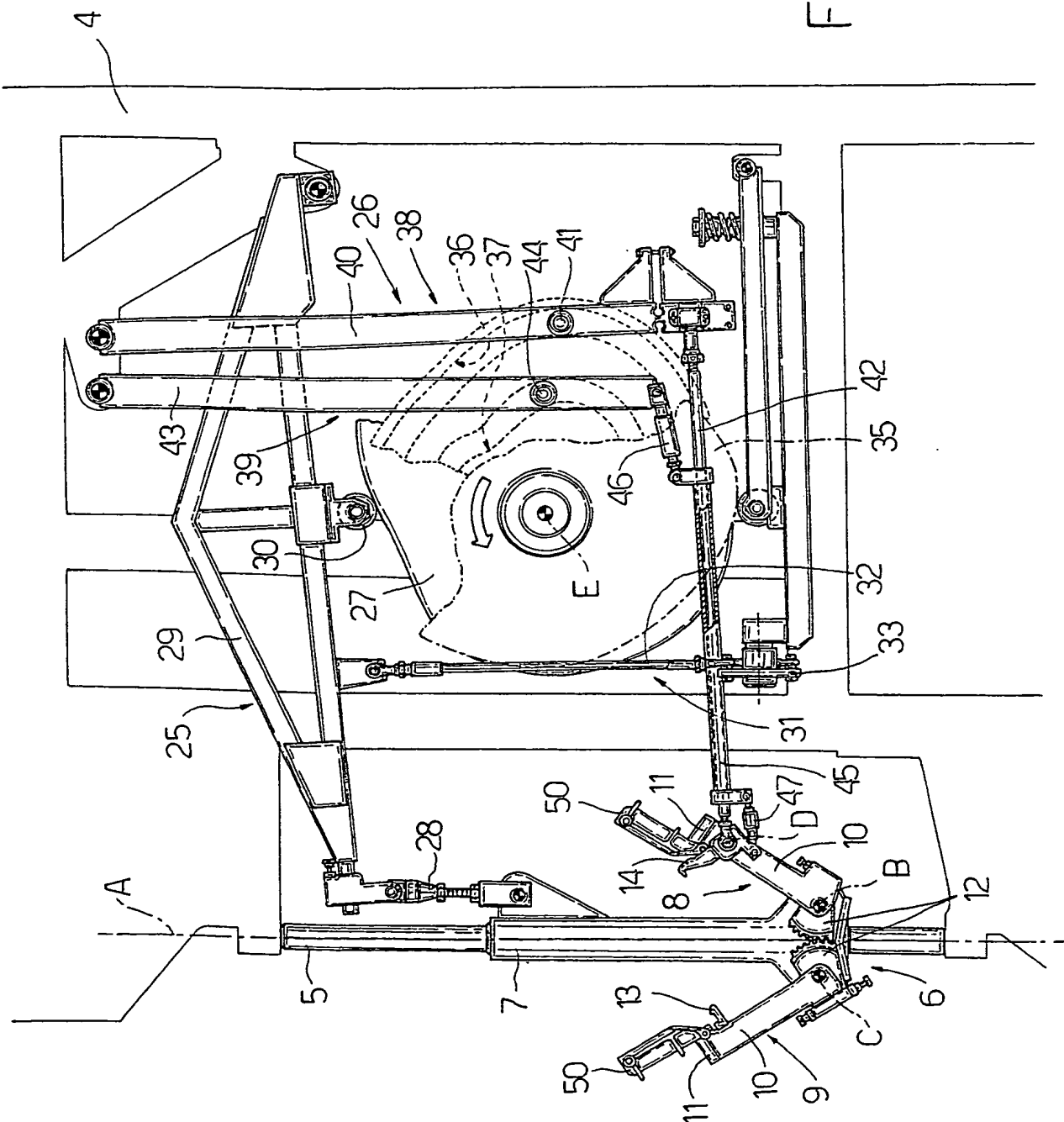
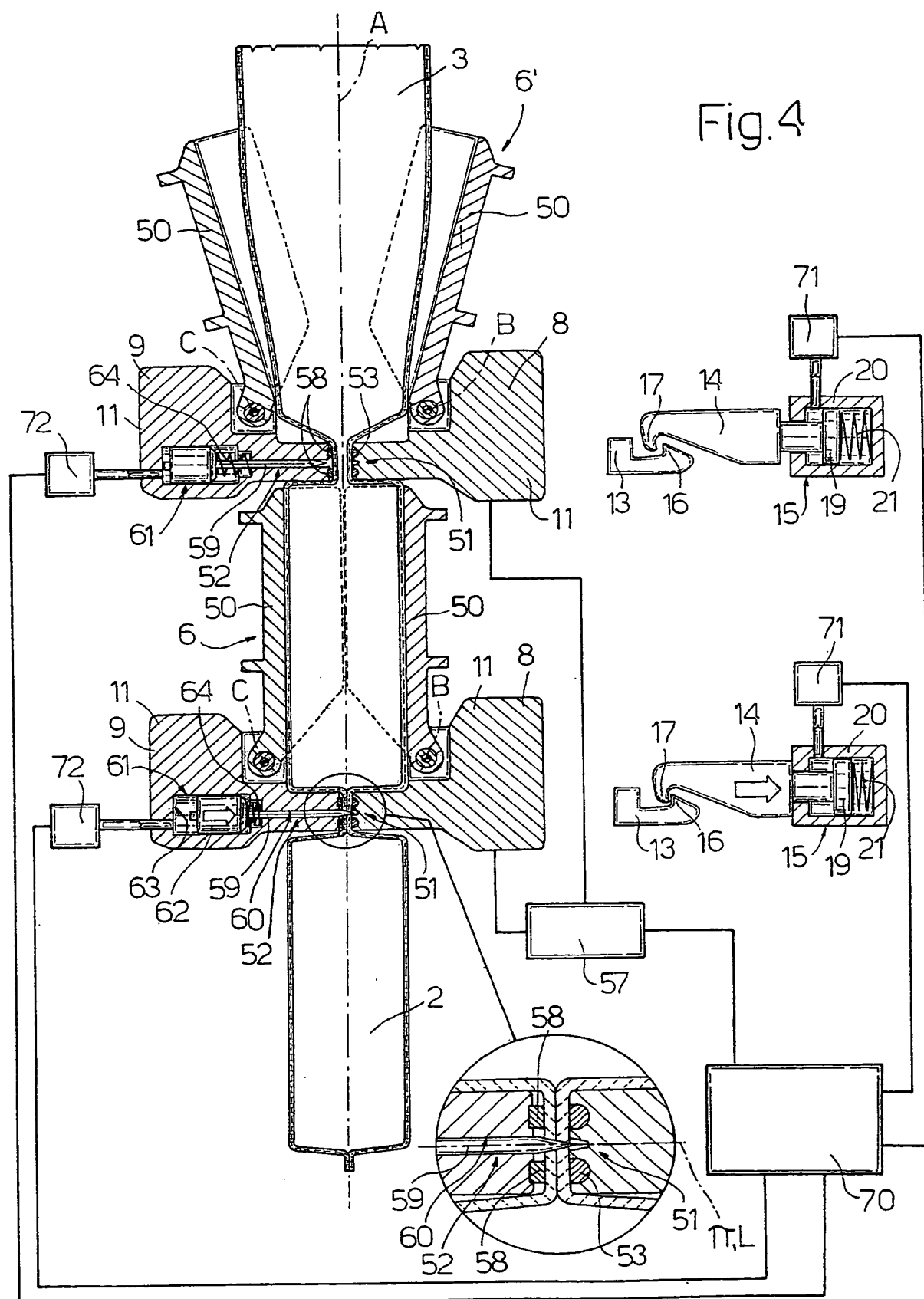






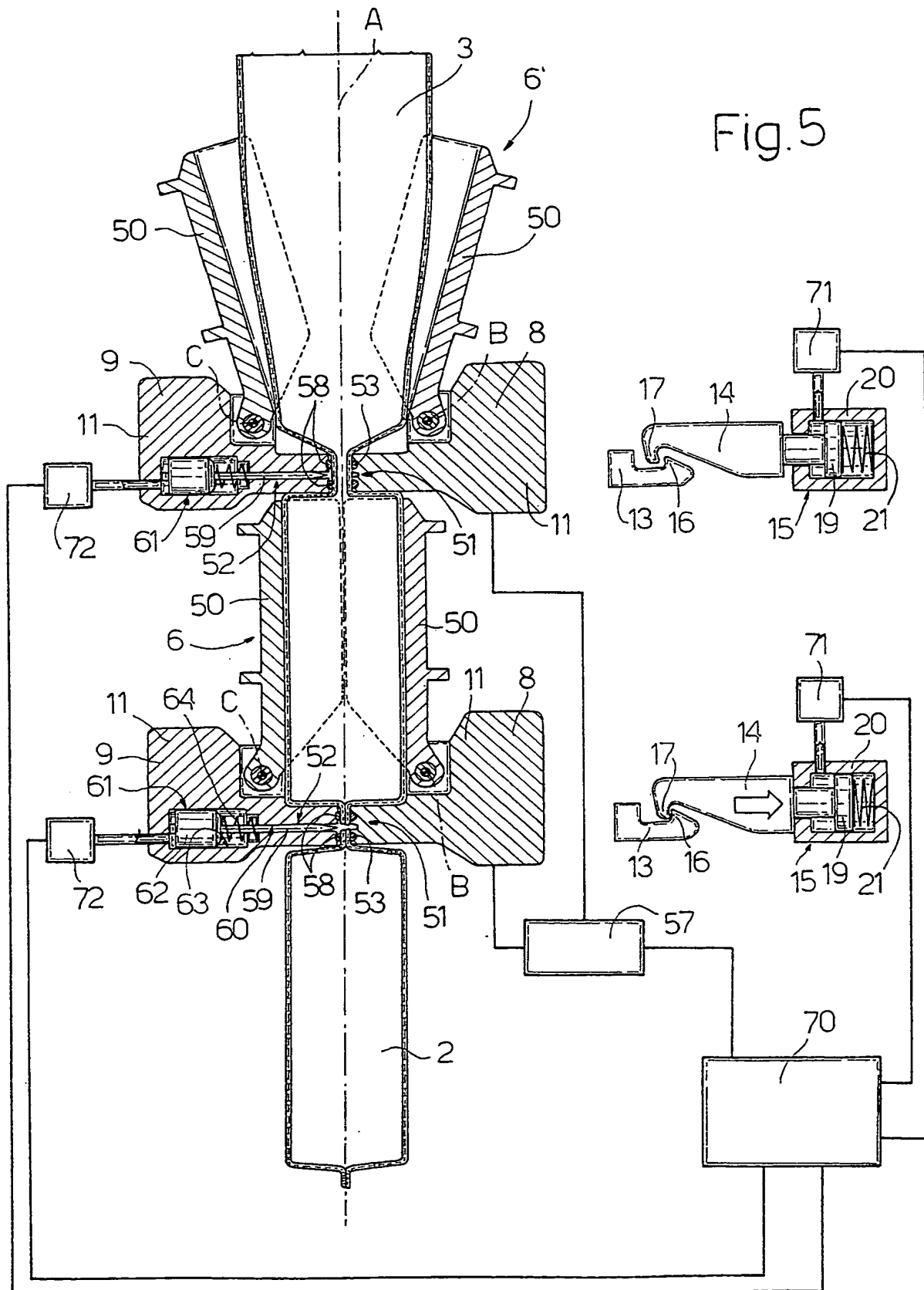
Fig. 3



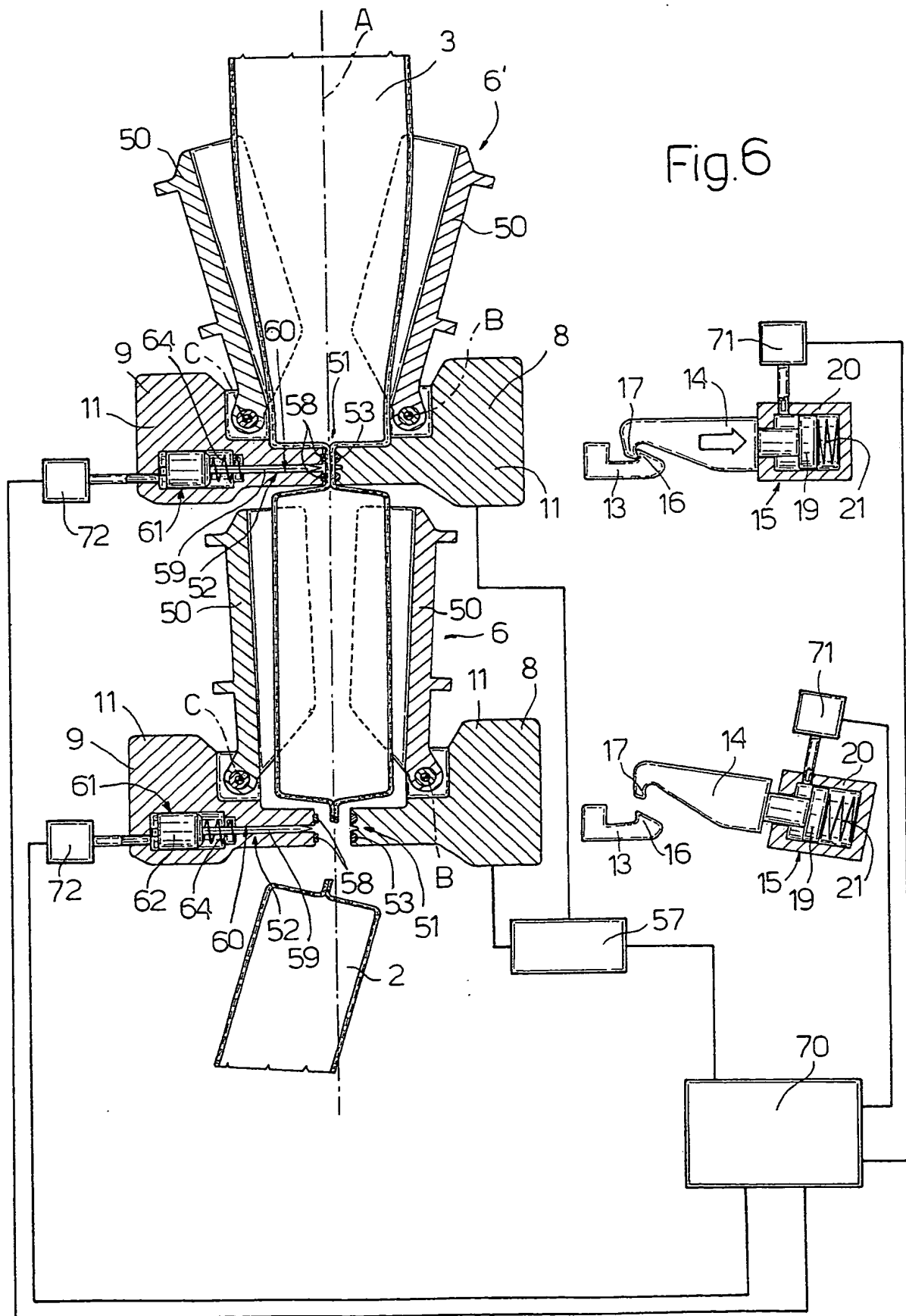


5 / 6

Fig.5



6 / 6



# INTERNATIONAL SEARCH REPORT

International Application No

PCT/EP 99/07505

**A. CLASSIFICATION OF SUBJECT MATTER**  
IPC 7 B65B9/20 B65B51/30

According to International Patent Classification (IPC) or to both national classification and IPC

**B. FIELDS SEARCHED**

Minimum documentation searched (classification system followed by classification symbols)

IPC 7 B65B B29C

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched

Electronic data base consulted during the international search (name of data base and, where practical, search terms used)

**C. DOCUMENTS CONSIDERED TO BE RELEVANT**

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X	US 5 755 076 A (OTSUKA YUZO) 26 May 1998 (1998-05-26)	1,2,7
Y	figures 3-5	4,6,11, 12
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Y	figures 1,18,20-26	4-6,8-12
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A	EP 0 460 540 A (TETRA PAK HOLDINGS SA) 11 December 1991 (1991-12-11) the whole document	1,5
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☒ Further documents are listed in the continuation of box C.

☒ Patent family members are listed in annex.

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Date of the actual completion of the international search

11 February 2000

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# INTERNATIONAL SEARCH REPORT

Inter. nat Application No

PCT/EP 99/07505

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